



## FEMA Requirement B3: Potential Impacts and Vulnerabilities

### Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction?

Local Mitigation Plan Review Guide, FEMA, 2011, page 20

This "Good Practice" document is intended to help plan developers understand the FEMA requirement related to identifying potential impacts and summarizing vulnerabilities from natural hazards. A well-researched assessment can identify important vulnerabilities to address within the mitigation strategy.

### Common Reasons Why FEMA Returns Plans for B3 Revisions

1. Impacts: Potential impacts have not been identified for each hazard of community concern.

**Tip:** Demonstrate impacts by referencing effects of historical events and/or future loss estimates, or possible situations.

2. The jurisdiction's susceptible assets are not identified.

**Tip:** In addition to structures and infrastructure, broaden the analysis to other assets such as places of cultural/historic or environmental value, locations of employment, tourism or recreation, along with populations having special

#### Know the Difference: "Impact" and "Vulnerability"

- ❖ **Impact** is the effect of the hazard on the community and its assets.

*The community determines its valued assets, e.g., populations, structures, facilities, cultural resources, capabilities, and/or activities.*

- ❖ **Vulnerability** is the degree to which assets are susceptible to the effects of hazards. Vulnerability depends upon exposure and sensitivity, and to adaptability for some assets especially in response to climate change.

needs because of physical, economic, demographic, cultural, or environmental challenges.

**Tip:** A greater range of community assets may be identified through public and stakeholder involvement.

3. Vulnerabilities: Only a list and/or map of assets are included. A description is not given of how susceptible this community's assets are to damage and loss from each profiled natural hazard. One example of explaining a susceptibility could be, "It is estimated that 25%, or 10 of the 40 residential structures in the community, are at-risk of wildfire damage, since these are within heavily forested locations without surrounding defensible space.

**Note:** Vulnerability can depend on location, construction, or contents. For instance, this may involve a location within a floodplain or on a steep hillside, construction not elevated or non-compliant with building codes, and/or susceptible contents such as antiques or documents, or other situations.

**Tip:** Utilize the input of stakeholders and the public to determine how the community sees its vulnerabilities, including those of greatest concern.

**Tip:** Describe the interdependent nature of assets, if appropriate, e.g., a wastewater treatment plant vulnerable to prolonged power outage and/or how flooding can impact business or government continuity, or the town's only fire station being vulnerable to annual flooding and not fully functional at those times with the potential to cost people their homes and/or lives during severe flooding.

**Tip:** Power outages and water contamination can be vulnerabilities arising from natural hazards, although these are occasionally misidentified as a hazard.

4. Overall Summary: Key issues or problems are not summarized in order to describe the community's greatest vulnerabilities.

**Note:** These same vulnerabilities should be addressed in the plan's mitigation strategy.

**Tip:** In developing the summary, describe the possible type(s) of local damage, while also explaining the populations and facilities at risk. Be sure to examine and explain risk to especially vulnerable groups or institutions, such as elderly, disabled persons, hospitals, nursing homes, daycare centers, schools, etc.

**Tip:** Many communities weave discussions of high concern vulnerabilities into the individual hazard profiles; this is acceptable. Another approach places such information in a single location summarizing vulnerability, so readers can more easily understand the issues and make the connection with the goals and actions following in the mitigation strategy.

**Tip:** If vulnerability and impact are discussed by the local committee and in community forums, the implications and results of these dialogs should be recorded within the plan.

4. A multi-jurisdiction plan does not describe impacts and/or vulnerabilities unique to each individual jurisdiction.

**Note:** Requirement C3 also *RECOMMENDS* practices **Beyond Minimum Requirements** for describing vulnerability. These include:

- a. describing the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazards areas;
- b. estimating the potential dollar losses to vulnerable structures in the community and describing the method of estimating; and
- c. providing a general description of land uses and development trends within the community.

## Plans Demonstrating Good Practice for Requirement B3

This section provides three examples demonstrating how a large city and two small towns effectively described impacts and summarized their vulnerabilities. Example 1 demonstrates how impacts and vulnerabilities can be described for a particular hazard; Examples 2 and 3 identify the overall findings of their community risk assessments in a general summary of key specific problems addressed in their mitigation strategies.

The abstracts are preceded by a brief explanation why each example meets the requirements. In addition, practices going “Beyond Minimum Requirements” are noted. Many other approaches are possible, so don’t be limited by these examples; the approach taken should fit the particular circumstances of the community.

### Example 1: *Town of Kent, CT, Hazard Mitigation Plan, 2014*

#### Why This Plan Demonstrates Good Practice

1. The profile of “Winter Storms” demonstrates how the community described specific impacts and vulnerabilities for each hazard that is profiled, including how conditions vary in some community locations.
2. The analysis of this hazard, Winter Storms, concludes with a summary statement of winter storm vulnerability.

**Beyond Minimum Requirements:** The plan considers changes in climate that may affect the community’s vulnerability, and create additional future impacts and losses.

3. The town understands its assets to be diverse: public facilities, infrastructure, vulnerable structures (with flat roofs), and special populations such as the elderly.
4. Plan developers used current historical data, including countywide data and past FEMA Public Assistance reimbursements, to extrapolate potential impacts and future losses.

**Beyond Minimum Requirements:** Vulnerability is described by an estimation of the past dollar losses to vulnerable structures in the community given with the source of this data.

See Abstract on following pages.

**Abstract from pages 6-8 through 6-10*****Town of Kent, CT, Hazard Mitigation Plan, 2014*****6.5 Vulnerabilities and Risk Assessment [for Winter Storms]**

Description – Based on the historic record in Section 6.3, Connecticut experiences at least one major nor'easter every four years although a variety of minor and moderate snow and ice storms occur nearly every winter. According to the 2014 *Connecticut Natural Hazard Mitigation Plan Update*, Connecticut residents can expect at least two or more severe winter weather events per season, including heavy snowstorms, potential blizzards, nor'easters, and potential ice storms. Fortunately, catastrophic ice storms are relatively less frequent in Connecticut than the rest of New England due to the close proximity of the warmer waters of the Atlantic Ocean and Long Island Sound.

According to the 2014 *Connecticut Natural Hazard Mitigation Plan Update*, recent climate change studies predict a shorter winter season for Connecticut (as much as two weeks) and less snow-covered days with a decreased overall snowpack. These models also predict that fewer, more intense precipitation events will occur with more precipitation falling as rain rather than snow. This trend suggests that future snowfalls will consist of heavier (denser) snow, and the potential for ice storms will increase. Such changes will have a large impact on how the state and its communities manage future winter storms and will affect the impact such storms have on the residents, roads, and utilities in the state.

After a storm, snow piled on the sides of roadways can inhibit sight lines and reflect a blinding amount of sunlight. When coupled with slippery road conditions, poor sightlines and heavy glare create dangerous driving conditions. Stranded motorists, especially senior and/or handicapped citizens, are at particularly high risk of injury or death from exposure during a blizzard. The elderly population in Kent, in particular, is susceptible to the impacts created by winter storms due to resource needs (heat, electricity loss, safe access to food, etc.).

The structures and utilities in the town of Kent are vulnerable to a variety of winter storm damage. Tree limbs and some building structures may not be suited to withstand high wind and snow loads. Ice can damage or collapse power lines, render steep gradients impassable for motorists, undermine foundations, and cause "flood" damage from freezing water pipes in basements.

Drifting snow can occur after large storms, but the effects in most areas are generally mitigated through municipal plowing efforts. However, the Town has indicated that snow drift is a problem on Skiff Mountain, especially near the Marvelwood School and Skiff Mountain Road. The school loses power frequently because the snow line comes up along North Kent Road, which is unpaved and difficult to access.

Icing causes difficult driving conditions throughout the hillier sections of the town. The Town's standard of presalting has been helpful in controlling ice in these problem areas.

*Continued on next page...*

**Abstract from pages 6-8 through 6-10*****Town of Kent, CT, Hazard Mitigation Plan, 2014****Continued:*

Similar to the discussion for hurricanes and summer storms in the previous two sections, no critical facilities are believed to be more susceptible to winter storm damage than any other. Some critical facilities are more susceptible than others to flooding damage due to winter storms. Such facilities susceptible to flooding damage were discussed in Section 3.5.

For municipal property, the Town budget for tree removal and minor repairs is generally adequate to handle winter storm damage although the plowing budget is often depleted. In particular, the heavy snowfalls associated with the winter of 2010-2011 drained the Town's plowing budget and raised a high level of awareness of the danger that heavy snow poses to roofs.

*Loss Estimates* – The 2014 Connecticut Natural Hazard Mitigation Plan provides annual estimated losses on a countywide basis for several hazards. Based on the population of Kent relative to Litchfield County, the annual estimated loss is \$1,524 for severe winter storms. The low figure is likely influenced by the difficulty in separating typical winter storm costs from those associated with extreme events. Nevertheless, the Town's public assistance reimbursements for the last three winter storm disasters were significant:

- January/February 2011: the FEMA reimbursement for this disaster was 75% of \$23,563.04
- Winter Storm Alfred, October 2011: the FEMA reimbursement for this disaster was 75% of \$36,797.90 incurred for debris removal.
- Winter Storm Nemo, February 2013: the FEMA reimbursement requests from the Town of Kent for Winter Storm Nemo totaled \$26,653.80.

*Summary* – The entire town of Kent is at relatively equal risk for experiencing damage from winter storms although some areas (such as icing trouble spots and neighborhoods with a high concentration of flat roofs) are more susceptible. Based on the historic record, it is likely that some winter storm events have costly consequences for the town. Nevertheless, many damages are relatively site specific and occur to private property (and therefore are paid for by private insurance) while repairs for power outages are often widespread and difficult to quantify to any one municipality.

## **Example 2: Greater Bridgeport Regional Council 2014 Natural Hazard Mitigation Plan Update**

### **Why This Plan Demonstrates Good Practice**

1. Overall vulnerability for hazards of local concern is summarized for each community participating in this multi-jurisdictional plan. The abstract shows this for one involved municipality, the City of Bridgeport.  
**Beyond Minimum Requirements:** The Greater Bridgeport plan summarized all hazard vulnerabilities in one location, e.g. the beginning of the mitigation strategy.
2. The summary is introduced with a statement describing how the problems were identified and used in developing the mitigation strategy.
3. The summary of problem statements reference potential impacts specific to the community. It identifies the populations and built environments/locations most vulnerable to the identified hazards, as well as their key associated impacts.  
**Note:** For a more detailed discussion of impacts, see plan *Section 3: Risk Identification and Assessment* at the web link below.
4. The communities' vulnerability summaries were developed through a meaningful public process (see the entirety of *Section 4: Mitigation* at the web link below).

See Abstract on following page.

### **Where to Obtain More Information about This Plan:**

<http://www.gbrct.org/programs/environmental-programs/regional-natural-hazard-mitigation-program/#.Vehdh7SsmvI>

**Abstract from Section 4.1, pages 4.1 and 4.2 (City of Bridgeport only)*****Greater Bridgeport Regional Council 2014 Natural Hazard Mitigation Plan Update******4.1 Problem Statements***

Key problem areas and critical issues for each municipality were identified through the risk and vulnerability assessments. The following problem statements were formed through the planning process and were utilized to develop a vision for the plan, a series of goals and objectives and mitigation actions.

**City of Bridgeport**

- Low lying neighborhoods and streets – Black Rock, the East End, East Side and South End – are susceptible to coastal flooding from excessive storm surge from hurricanes, tropical storms, extra-tropical storms, and nor’easters. Vulnerable and at risk populations, including low income, minorities, persons with limited English proficiency, elderly and disabled persons disproportionately live in flood prone areas.
- Housing stock in areas at risk of coastal flooding from extreme weather is older and less able to withstand the forces of storm surges.
- Several coastal features are vulnerable to damage from extreme weather, including Ash Creek, Seaside Park, Pleasure Beach and Johnson’s Creek.
- Access to some parts of the City can be cut-off due to flooding, especially at underpasses of the New Haven rail line and I-95.
- The City operates two wastewater treatment plants, both of which are located in flood hazard areas and flooding can cause overflows of wastewater and pollution to enter Long Island Sound.
- Several sections of the City are served by combined sewer systems. These combined systems can be overwhelmed by excessive runoff from heavy rain events and cause overflows of wastewater from the sewage treatment plants.
- The City operates Reverse 9-1-1 and EverBridge systems to notify residents about approaching extreme weather or mandatory evacuation orders, but reaching those with limited English proficiency remains a challenge. (Preparedness-related)

Schools are used as emergency shelters. The schools are appropriate for short term shelter needs but are not appropriate for long term use as shelters, especially for people with medical needs. (Preparedness-related)



**Example 3: *Town of Chelsea, Vermont 2015 Hazard Mitigation Plan*****Why This Plan Demonstrates Good Practice**

1. The Vulnerability Summary contains problem statements explaining the assessment regarding impacts and vulnerabilities. It provides the basis for the mitigation strategy.  
**Beyond Minimum Requirements:** The Chelsea plan summarized all hazard vulnerabilities in one location, e.g. the end of the risk assessment.
2. Each problem statement emphasizes the potential causes and/or consequences (impacts) of the identified vulnerability, ranging from physical issues to data and regulatory shortcomings.
3. The Summary identifies the specific facilities and locations which are vulnerable.
4. The Summary is easy to comprehend, and links the high concern vulnerabilities to each hazard profiled within the plan.

See Abstract on following page.

## Abstract from page 36

***Town of Chelsea, Vermont 2015 Hazard Mitigation Plan******C. Vulnerability Summary***

As a result of the above profile of hazards, the town believes the following vulnerabilities to be of highest concern because of their potentially severe consequences and potential likelihood:

- Ice Jams: A major jam on Jail Brook could be catastrophic to the village. Inadequate bridge design contributes to the threat;
- Hazardous Materials: A truck traffic accident on Routes 110 and 113, especially at their intersection, could cause a major spill. This could threaten the village water supply and contaminate the White River and/or Jail Brook;
- Flooding: One of the worst threats, flooding impacts roads and the village, especially facilities for children, elders, and low-income housing. Under-sized bridges and culverts factor into the threat, as do out-dated flood hazard mapping. Furthermore, flood hazard mapping (Special Flood Hazard Areas) does not adequately encompass all areas that could be flooded, thus potentially making some residents too complacent in regard to the threat. In addition, the town's current flood bylaw does not address fluvial erosion that is a threat at higher elevations, especially along roadways. In addition, the fire station and three wells in the floodplain could be impaired by a major flood event.
- Severe Winter Weather: Another threat to the town is from heavy snow loads that can down power lines, communications, and collapse roofs. Prolonged power outages can interrupt public and business services.

## B3 Regulatory Guidance

### Abstracts from *Code of Federal Regulations and Local Mitigation Plan Review Guide, October 1, 2011*

#### Element B3 Regulation [§201.6(c) (2) (ii)] (page 18)

[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards [that can affect the jurisdiction] described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community... The plan should describe vulnerability in terms of:

- (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
  - (B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.
  - (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
- [Note: (C) above is covered under Requirement D1.]

#### Element Intent (page 20)

For each jurisdiction to consider their community as a whole and analyze the potential impacts of future hazard events and the vulnerabilities that could be reduced through hazard mitigation actions.

#### Element Requirements (page 20)

- a. For each participating jurisdiction, the plan **must** describe the potential impacts of each of the identified hazards on the community.

***Impact*** means the consequence or effect of the hazard on the community and its assets. Assets are determined by the community and include, for example, people, structures, facilities, systems, capabilities, and/or activities that have value to the community. For example, impacts could be described by referencing historical disaster impacts and/or an estimate of potential future losses (such as percent damage of total exposure).

- b. The plan **must** provide an overall summary of each jurisdiction's vulnerability to the identified hazards. The overall summary of vulnerability identifies structures, systems, populations or other community assets as defined by the community that are susceptible to damage and loss from hazard events. A plan will meet this sub- element by addressing the requirements described in §201.6(c) (2)(ii)(A- C).

Vulnerable assets and potential losses is more than a list of the total exposure of population, structures, and critical facilities in the planning area. An example of an overall summary is a list of key issues or problem statements that clearly describes the community's greatest vulnerabilities and that will be addressed in the mitigation strategy.

***Check Out These Additional Aids***

Local Mitigation Plan Review Guide, October 2011

<http://www.fema.gov/media-library/assets/documents/23194>

Local Mitigation Planning Handbook, March 2013 (pages 5-13 through 5-20)

<http://www.fema.gov/media-library/assets/documents/31598>